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First Named Inventor	MARY W. EUBANKS
Art Unit	1638
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ENCLOSURES *(Check all that apply)*

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
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THE $250 fee has been paid.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	PRO SE APPLICATION		
Signature	Mary W. Eubanks		
Printed name	MARY W. EUBANKS		
Date		Reg. No.	

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Signature	Mary W. Eubanks		
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.: 10/614,255 Confirmation No.: 6006
Applicant(s): Eubanks
Filed: July 3, 2003
Art Unit: 1638
Examiner: Keith Robinson
Title: METHOD AND MATERIALS FOR INTROGRESSION OF NOVEL GENETIC VARIATION IN MAIZE

Docket No.:
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APPEAL BRIEF UNDER 37 CFR § 41.37

This Appeal Brief is filed pursuant to the "Notice of Appeal to the Board of Patent Appeals and Interferences" filed June 27, 2008. Please note the fee has already been paid. An Appeal Brief with a check in the amount of $250 was originally filed in accordance with the 37 CFR 41.20(b)(2) small entity fee requirement for filing a brief in support of an appeal on May 26, 2007. By way of explanation, in an Office Action dated August 29, 2007, the Examiner re-opened prosecution for this case and withdrew his second Final Office Action mailed November 29, 2006. Therefore, this Appeal Brief is filed pursuant to the second "Notice of Appeal to the Board of Patent Appeals and Interferences" filed June 27, 2008, in response to the Examiner's Office Action mailed April 28, 2008.

1. ***Real Party in Interest.***

The real party in interest in this appeal is Mary Wilkes Eubanks, the inventor of the above-referenced patent application.

2. ***Related Appeals and Interferences.***

There are no related appeals and/or interferences involving this application or its subject matter.

3. ***Status of Claims.***

Claims 44-70 are the subject of this appeal.

Claim 23, previously allowed by the Examiner, was rejected on the grounds of nonstatutory obviousness-type double patenting. In compliance with 37 CFR 1.321 a terminal disclaimer was filed on June 28, 2008 to overcome the double patenting rejection.

Claims 44-61 stand rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement.

Claims 44-70 stand rejected under 35 USC §103(a) as unpatentable over Eubanks (US Patent No. 5,330,547) in view of Eubanks (Theor. Appl. Genet. 94:707-712, 1997).

Claims 44-70 stand rejected under 35 USC §103(a) as unpatentable over Eubanks (US Patent No. PP7,977) in view of Eubanks (Theor. Appl. Genet. 94:707-712, 1997).

Claims 71-79 stand rejected under 35 USC §103(a) as unpatentable over Eubanks (Theor. Appl. Genet. 94:707-712, 1997) in view of Eubanks (US Patent No. PP7,977).

4. ***Status of Amendments.***

Following the suggestion of the Examiner, Claims 44, 53 and 62 have been amended to independent form. Further, in accordance with the Examiner's recommendation, claims 45, 54 and 72 have been amended to delete the objectionable wording, "molecular components".

Independent claims 44, 53 and 62 have been amended to recite specific restriction fragments as in previously allowed claim 23. Moreover, claims 44, 53 and 62 have been amended to recite a maize plant rather than the method for producing a maize plant. Accordingly, dependent claims 45-52, 54-61, and 63-70 have been amended to reflect the change in scope of independent claims 44, 53 and 62.

Claims 71-79 have been canceled to expedite prosecution. The Applicant reserves the right to file a continuation or divisional application or to take other such appropriate action to seek protection of the canceled subject matter. Support for these claim amendments can be found in the specification and claims as originally filed.

These amendments were made in Applicant's Amendment and Response filed June 28, 2008 in response to the Examiner's Office Action mailed April 28, 2008. Accordingly, while Applicant has not received notification from the Examiner, it is believed that such amendments will be entered.

5. ***Summary of Claimed Subject Matter.***

Independent claim 23 is drawn to a method identifying a maize progeny plant having a restriction fragment introgressed from a *Tripsacum*/teosinte hybrid. Support for claim 23 can be found, at least, in paragraphs 0003, 0072, 0073, 0074, 0106, 0112, 0121, and 0122 of the corresponding published application, US 2004/0133951; in Tables 1-5; and in original claims 1 and 7.

Independent claim 44 is drawn to a maize plant comprising one or more restriction fragments selected from a group of restriction fragments set forth in the claim. Support for claim 44 can be found, at least, in paragraphs 0019, 0129, 0072, 0074, 0075, and 0129; in Tables 1-5; and in original claims 2, 4, 8, and 10.

Independent claim 53 is drawn to a maize plant comprising one or more restriction fragments selected from the listed group of fragments. Support for claim 53 can be found, at least, in paragraphs 0019, 0129, 0072, 0074, 0075, and 0129; in Tables 1-5; and in original claims 2, 4, 8, and 10.

Independent claim 62 is drawn to a maize plant comprising one or more restricton fragments selected from the listed group of fragments. Support for claim 53 can be found, at least, in paragraphs 0019, 0111, 0129, 0072, 0074, 0075, and 0129; in Tables 1-5; and in original claims 2, 4, 8, and 10.

Dependent claims 45 and 54 are drawn to seed, pollen, derivatives, progeny, variants, mutants, modifications, and cellular components. Support for claims 45 and 54 can be found, at least, in paragraphs 0072, 0073, and 0074; and in original claims 3, 9, and 10-12.

Dependent claims 46 and 55 are drawn to a maize plant whereby roots of said plant contain aerenchyma. Support for claims 46 and 55 can be found, at least, in the abstract; and in paragraphs 0003, 0020, 0075, 0115, 0117, 0118, 0119, and 0124.

Dependent claims 47 and 56 are drawn to a maize plant that is drought tolerant. Support for claims 47 and 56 can be found, at least, in paragraph 0020, 0118, and 0119.

Dependent claims 48 and 57 are drawn to a maize plant that is tolerant to corn rootworm. Support for claims 48 and 57 can be found, at least, in the abstract; and in paragraphs 0020, 0115, 0116, 0121, and 0123.

Dependent claims 49 and 58 are drawn to a maize plant that comprises a novel band identified by SSR probe phi123. Support for claims 49 and 58 can be found, at least, in Table 5 and in paragraphs 0116 and 0123.

Dependent claims 50 and 59 are drawn to a maize plant that comprises a novel band identified by SSR probe bnlg2235. Support for claims 50 and 59 can be found, at least, in Table 5 and in paragraphs 0116, 0120, and 0123.

Dependent claims 51 and 60 are drawn to a maize plant that comprises a novel band identified by SSR probe dupSSR23. Support for claims 51 and 60 can be found, at least, in Table 5 and in paragraphs 0116 and 00123.

Dependent claims 52 and 61 are drawn to a maize plant that comprises a novel band identified by SSR probe bnlg1805. Support for claims 52 and 61 can be found, at least, in Table 5 and in Table 5 and in paragraph 0124.

6. ***Grounds of Rejection to be Reviewed on Appeal.***

Issue 1 – Whether claims 44-61 meet the written description requirement of 35 U.S.C. § 112, first paragraph.

Issue 2 – Whether claims 44-70 are obvious in view of U.S. Patent No. 5,330,547 (hereinafter the '547 patent) and Eubanks (1997) *Theor. Appl. Genet.* 94:707-712 under 35 U.S.C. § 103(a).

Issue 3 – Whether claims 44-70 are obvious in view of U.S. Patent No. PP7,977 (hereinafter the '977 patent) and Eubanks (1997) *Theor. Appl. Genet.* 94:707-712 under 35 U.S.C. § 103(a).

7. ***Grouping of Claims.***

The claims stand or fall together.

8. ***Argument.***

(a) *Issue 1 - Whether claims 44-61 meet the written description requirement of 35 U.S.C. § 112, first paragraph.*

The Examiner has rejected claims 44-61 under 35 U.S.C. § 112, first paragraph as failing to satisfy the written description requirement. This rejection is respectfully traversed. For the

reasons set forth below, the rejection of the claims under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement should be reversed.

I. The Claimed Invention Meets the Requirements of 35 U.S.C. § 112, First Paragraph, for Written Description

An adequate written description for genetic material requires a precise definition, "such as by structure, formula, chemical name, or physical properties." See *Enzo Biochem Inc. v. Gen-Probe, Inc.*, 323 F.3d 956, 962-63, 970 (Fed. Cir. 2002). The goal of the written description requirement is to clearly convey that an applicant has invented the subject matter which is claimed. See, for example, *In re Barker*, 559 F.2d 588, 592 (CCPA 1977). To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. See, *Moba, B.V. v. Diamond Automation, Inc.* 325 F.3d 1306, 1319, (Fed. Cir. 2003); and *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991). The written description inquiry focuses on whether the specification reasonably conveys to one skilled in the art whether the applicant invented the claimed subject matter. Thus, the relevant inquiries are: What is the applicant's claimed invention? What is now claimed?

A. The Claimed Methods are Adequately Described in the Specification

Independent claims 44 and 53 are directed to methods of producing a maize plant wherein said method utilizes the step of backcrossing the trigeneric hybrid at least once to maize. The Examiner asserts that the specification does not contain support for backcrossing the trigeneric hybrid at least once to a maize plant. See, Office Action mailed April 28, 2008, page 4, paragraph 2. The applicant respectfully notes that the specification provides support for backcrossing the trigeneric hybrid at least once to maize in paragraph [0074] of published application 20040133951. In fact, paragraph [0074] expressly states, "To produce a backcross hybrid maize plant, the hybrid plant obtained from maize X (*Tripsacum* X teosinte) or maize X (teosinte X *Tripsacum*) is backcrossed to maize."

Specifically, the method of producing a plant of step (a) of claim 44 and step (a) of claim 53 is described in paragraph [0073] of the published application as follows: "To produce a maize X *Tripsacum*-teosinte plant or the reciprocal *Tripsacum*-teosinte X maize plant, the intergeneric hybrid plant (*Tripsacum* X teosinte) or (perennial teosinte X *Tripsacum*) is crossed with maize

by controlled pollination. In the cross, the pollen of (*Tripsacum* X teosinte) or (teosinte X *Tripsacum*) is transferred to maize silks, or maize pollen is transferred to the silks of (*Tripsacum* X teosinte) or (teosinte X *Tripsacum*)." Further, methods for producing backcrosses to an F_1 trigeneric hybrid of step (a) found in step (b) of claims 44 and step (b) of claim 53 is described in paragraph [0074] as follows: "To produce a backcross hybrid maize plant, the hybrid plant obtained from maize X (*Tripsacum* X teosinte) or maize X (teosinte X *Tripsacum*) is backcrossed to maize. In the backcross, the pollen of the trigeneric hybrid plant is transferred to the silks of one of the original parents (*Tripsacum* X teosinte) or (teosinte X *Tripsacum*) or maize."

For further clarification, the Applicant respectfully points out that paragraph [0111] describes the advanced maize lines (9094 X 7009), (97-5 X 97-1), and V70 as recurrent maize backcross lines. These recurrent maize lines describe trigeneric hybrid plants backcrossed to maize, thereby providing literal support for claims 45-52 and 54-61.

In the present application, support for backcrossing the trigeneric hybrid at least once to a maize plant is provided. Accordingly, the application meets the requirement for written description for the claims. In view of the above arguments, all grounds for rejection under 35 U.S.C. § 112, first paragraph, should be reversed.

(b) *Issue 2 – Whether claims 44-70 are obvious in light of U.S. Patent No. 5,330,547 and Eubanks (1997) Theor. Appl. Genet. 94:707-712 under 35 U.S.C. § 103(a).*

Claims 44-70 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '547 patent in view of Eubanks (1997) *Theor. Appl. Genet.* 94:707-712. Establishing a *prima facie* case of obviousness requires assessment of the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), which provides the framework for applying the statutory language of § 103. Under the "Graham Factors," the Examiner is required to:

1. Determine the scope and content of the prior art;
2. Ascertain the differences between the prior art and the claims at issue;

3. Resolve the level of ordinary skill in the pertinent art; and
4. Consider any relevant secondary considerations.

Furthermore, a *prima facie* case of obviousness under 35 U.S.C. § 103(a) requires that the combination of references places the claimed subject matter in the public domain prior to Applicants' date of invention. See *In re Zenitz*, 333 F.2d 924, 142 USPQ 158 (C.C.P.A. 1964). Thus, establishing a *prima facie* case of obviousness requires that the cited references can be combined such that each and every element of the claimed invention is taught, explicitly or implicitly, by the references and that a reasonable expectation of success exists in such a combination. For the following reasons, a *prima facie* case of obviousness has not been established, and the rejection of the claims should be overturned.

I. The '547 patent and the Eubanks reference cannot be combined to arrive at the claimed methods.

As described above, independent claims 44-61 are directed to a maize plant, wherein said maize plant is produced by cross pollinating a maize plant with either a (*Tripsacum* X teosinte) plant or a (teosinte X *Tripsacum*) plant to produce a trigeneric hybrid maize plant and backcrossing said hybrid plant at least once to a maize plant. Contrary to the Examiner's conclusions, the cited references would not allow one of skill in the art to produce the claimed plants, as required to establish a prima facie case of obviousness. Neither the '547 patent nor the Eubanks reference teaches the recited step of backcrossing a *Tripsacum*-teosinte-maize hybrid to maize. Further, as the Examiner points out, because "introgression of *Tripsacum* genetic material into maize . . . has required years of complicated high risk breeding programs that involve many generations to stabilize desirable *Tripsacum* genes in maize" one of ordinary skill in the art would **not** have thought that *Tripsacum* genes would be stably inherited in successive backcross generations of maize X *Tripsacum*-teosinte.

Neither the '547 patent nor the Eubanks reference teaches or even suggests the recited maize plant comprising one or more of the specified restriction fragments listed in independent claims 44 and 53. The claims are drawn to maize plants having a large set of stably inherited novel alleles formed in intergeneric hybrids between *Tripsacum* and teosinte identified by their unique molecular weights as detected by specific RFLP probe-restriction enzyme combinations when compared to the molecular weights of the corresponding parental alleles. The Examiner

referenced Eubanks (1997) to point out that Doebley et al. (1990) identified over 50 RFLPs associated with quantitative trait loci (QTLs) in maize. Eubanks (1997) employed 15 RFLP markers to genotype two *Tripsacum*-diploperennis hybrids designated Sun Dance and Tripsacorn. In accordance with basic genetic principles that a progeny of two parents will inherit an allele from each parent at every genetic locus, Eubanks (1997) examined parental allelic inheritance and reported the number of alleles revealed by the 15 RFLPs in *Tripsacum*, *Z. diploperennis*, the recombinant progeny from crosses between *Tripsacum* and *Z. diploperennis*, and how many of those parental alleles were shared in the progeny. The findings of Eubanks (1997) that the *Tripsacum*-teosinte recombinant plants had inherited alleles from each parent supported the basic principles of inheritance of parental alleles that one skilled in the art would expect.

The dataset generated by the 15 RFLPs employed in Eubanks (1997) did not indicate that precise rearrangements between the parental genomes were creating large numbers of novel alleles. This mutability phenomenon was only subsequently discovered when many more molecular markers were used to screen more *Tripsacum*-teosinte recombinants and *Tripsacum*-teosinte-maize hybrids. Eubanks (1997) underscores that it would not have been obvious to one skilled in the art that: (1) large numbers of novel alleles are generated by crossing *Tripsacum* and teosinte; (2) many of the same novel alleles would be found in progeny of different parents, and (3) the novel chimeric alleles would be stably inherited in subsequent generations of crosses and backcrosses to maize. Neither the '547 patent, nor the Eubanks reference teach or suggest the novel alleles formed by intergeneric recombination between the distinctive genomes of *Tripsacum* and teosinte claimed in the present application.

The present invention has now demonstrated that *Tripsacum* genes can be stably inherited in backcross generations of maize X *Tripsacum*-teosinte. Furthermore, the plants are characterized by novel restriction fragments that are useful for identifying the plants of the invention.

In view of the above arguments, the Appellant contends that a prima facie case of obviousness under 35 U.S.C. § 103(a) in light of the '547 patent and the Eubanks reference has not been established. Therefore, Appellant requests that this rejection of claims 44-70 be overturned.

(c) *Issue 3 – Whether claims 44-70 are obvious in light of the '977 patent and Eubanks (1997) Theor. Appl. Genet. 94:707-712 under 35 U.S.C. § 103(a).*

Claims 44-70 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '977 patent in view of Eubanks (1997) *Theor Appl Genet* 94:707-712. For the following reasons, a prima facie case of obviousness has not been established, and the rejection should be overturned.

I. The '977 patent and the Eubanks reference cannot be combined to arrive at the claimed methods.

As described above, independent claims 44-61 are directed to a maize plant, wherein said maize plant is produced by cross pollinating a maize plant with either a (*Tripsacum* X teosinte) plant or a (teosinte X *Tripsacum*) plant to produce a trigeneric hybrid maize plant and backcrossing said hybrid plant at least once to a maize plant. Contrary to the Examiner's conclusions, the cited references would not allow one of skill in the art to produce the claimed methods, as required to establish a prima facie case of obviousness. Neither the '977 patent nor the Eubanks reference teaches the recited step of backcrossing a *Tripsacum*-teosinte-maize hybrid to maize. The '977 patent is directed to a cross between a *Tripsacum* female and a *Z. diploperennis* pollen donor that is an asexually reproducible plant named Tripsacorn, but does not describe subsequent advanced backcrossed generations.

Further, as described above, neither the '977 patent nor the Eubanks reference teaches or even suggests the recited maize plant comprising one or more of the specified restriction fragments listed in independent claims 44 and 53. The claims are drawn to maize plants having a large set of stably inherited novel alleles formed in intergeneric hybrids between *Tripsacum* and teosinte identified by their unique molecular weights as detected by specific RFLP probe-restriction enzyme combinations when compared to the molecular weights of the corresponding parental alleles. The Examiner referenced Eubanks (1997) to point out that Doebley et al. (1990) identified over 50 RFLPs associated with quantitative trait loci (QTLs) in maize. Eubanks (1997) employed 15 RFLP markers to genotype two *Tripsacum*-diploperennis hybrids designated Sun Dance and Tripsacorn. In accordance with basic genetic principles that a progeny of two parents will inherit an allele from each parent at every genetic locus, Eubanks (1997) examined parental allelic inheritance and reported the number of alleles revealed by the 15 RFLPs in

Tripsacum, *Z. diploperennis*, the recombinant progeny from crosses between *Tripsacum* and *Z. diploperennis*, and how many of those parental alleles were shared in the progeny. The findings of Eubanks (1997) that the *Tripsacum*-teosinte recombinant plants had inherited alleles from each parent supported the basic principles of inheritance of parental alleles that one skilled in the art would expect.

The dataset generated by the 15 RFLPs employed in Eubanks (1997) did not indicate that precise rearrangements between the parental genomes were creating large numbers of novel alleles. This mutability phenomenon was only subsequently discovered when many more molecular markers were used to screen more *Tripsacum*-teosinte recombinants and *Tripsacum*-teosinte-maize hybrids. Eubanks (1997) underscores that it would not have been obvious to one skilled in the art that: (1) large numbers of novel alleles are generated by crossing *Tripsacum* and teosinte; (2) many of the same novel alleles would be found in progeny of different parents, and (3) the novel chimeric alleles would be stably inherited in subsequent generations of crosses and backcrosses to maize. Neither the '977 patent, nor the Eubanks reference teach or suggest the novel alleles formed by intergeneric recombination between the distinctive genomes of *Tripsacum* and teosinte claimed in the present application.

In view of the above, a *prima facie* case of obviousness has not been established and the rejection of the claims under 35 U.S.C. §103(a) should be reversed.

Additional Arguments

Both the obviousness rejections rely on the Examiner's assertions that backcrosses to maize of the hybrid plants would be straightforward. For the reasons below, the rejections should be reversed.

The specification and claims are drawn to maize plants having a large set of stably inherited novel alleles formed in intergeneric hybrids between *Tripsacum* and teosinte identified by their unique molecular weights as detected by specific RFLP probe-restriction enzyme combinations when compared to the molecular weights of the corresponding parental alleles. Rather than inheriting an allele from each parent in accordance with principles of genetic inheritance in sexually reproducing organisms, through recombination of their distinctive genomes the progeny of crosses between *Tripsacum* and teosinte exhibit novel alleles formed at precise genetic loci designated in the application. These novel or mutant alleles are visualized as

bands on autoradiographs and are precisely described by their molecular weight and specific probe-enzyme combination. The genetic material disclosed herein is unprecedented in the plant literature and would **not** have been obvious to one skilled in the art of genetics and plant breeding. As stated in the specification, page 20, paragraph 1, "Such mutant or novel rearrangements in the genetic material are revealed by comparative analysis of the RFLP bands of the parent plants and hybrid progeny. Bands present in the offspring not found in either parent indicate regions of the genome where novel genetic material has arisen, i.e., mutations have occurred. . . In addition to the rarity and usual deleterious effect of mutations, a basic biological tenet is that mutations occur at random or by chance (Lewin 1997). In a study of spontaneous mutation rates to new length alleles at tandemly repeated loci in human DNA (Jeffreys et al. 1988) mutations arose sporadically and there was no clustering of mutations within a family. Siblings never shared a common mutant allele." Therefore, it is completely unexpected that the same novel alleles recur and are not derived at random or by chance, and that the same novel alleles are found in hybrid progeny derived from crossing different *Tripsacum* and different teosinte parent plants.

As stated in the specification, page 23, last paragraph, beginning on line 6, continuing on page 24: "The unique *Tripsacum* polymorphisms and recombinant chimeric RFLPs, their heritability in succeeding generations of *Tripsacum*-teosinte hybrids, and their transmissibility to maize is unprecedented and unexpected based on prior art." Eubanks' 1992 and 1994 patents make no reference to molecular markers, and Eubanks (1997) is silent as to the unique alleles described in this invention. Because these novel alleles defy everything we know about mutations, mutation frequencies, and heritability in siblings (see detailed discussion above and in the specification, pages 2-3 and page 20), it was **not** obvious to, nor anticipated by one skilled in the art that a high frequency of novel recombinant alleles (i.e. mutations not found in either parent) would be found in progeny derived from crossing *Tripsacum* and teosinte. Nor was it obvious, nor anticipated by, one skilled in the art that the same novel recombinant alleles (i.e. mutations not found in either parent) would be found in progeny from crossing different *Tripsacum* and teosinte plants from different populations and geographical regions. This is unprecedented in the literature, defies the conventional paradigm for allelic inheritance in genetics, and clearly establishes that the prior art would neither anticipate nor render obvious the claimed invention.

Construction of the maize genetic map using RFLPs was possible because each maize parent contributes the same parental allele per locus to the hybrid progeny produced by crossing two inbred lines (Gardiner et al. 1993). In maize, RFLP markers (i.e. probes) detect three or four alleles (i.e. polymorphisms) at each genetic locus in an easily interpretable pattern across a variety of inbred lines (Gardiner et al. 1993, p. 925). In this invention **rather than inheriting an allele from each parent, the progeny of crosses between *Tripsacum* and teosinte exhibit novel alleles formed by intergeneric recombination between the distinctive genomes of *Tripsacum* and teosinte.**

Two of the many examples in the specification illustrate how the materials that are the subject of this application are distinct and unexpected based on the prior art. Referring to the parental alleles for RFLP marker UMC 107-ERI on chromosome 1 of maize, presented in Table 4, page 49 of the specification, when digested with the restriction enzyme *Eco*R1, *Tripsacum* has a 7.9 kb restriction fragment and a 1.5 kb restriction fragment, and *Zea diploperennis* has a 7.1 kb fragment. Based on the genetic principles of inheritance we would expect the *Tripsacum*-teosinte hybrid progeny of those two parents to contain either a 7.9 kb or a 1.5 kb fragment from the *Tripsacum* parent and a 7.1 kb fragment from the teosinte parent. Referring to Table 2, page 35 of the specification, it can be seen that the *Tripsacum* X teosinte recombinant progeny referred to as Tripsacorn contains unexpected novel fragments that are 6.3 kb and 6.1 kb in size. The 6.3 kb novel fragment is also found in the teosinte X *Tripsacum* recombinant progeny referred to as Sun Star. The novel fragments revealed by UMC107-ERI are also found in subsequent crosses between maize and *Tripsacum*-teosinte recombinants designated 64SS, 2019, 3024, and 3125.

A second example of how this invention is unexpected can be seen for RFLP marker UMC 140-ERI on chromosome 1 of maize, presented in Table 4, page 49 of the specification. When digested with the restriction enzyme *Eco*R1, *Tripsacum* has a 10.9 kb restriction fragment and a 7.5 kb restriction fragment, and *Zea diploperennis* has a 2.6 kb fragment. Based on the genetic principles of inheritance we would expect the *Tripsacum*-teosinte hybrid progeny of those two parents to contain either a 10.9 kb or a 7.5 kb fragment inherited from the *Tripsacum* parent and a 2.6 kb fragment from the teosinte parent. Referring to Table 2, page 35 of the specification, it can be seen that the *Tripsacum* X teosinte recombinant progeny referred to as Tripsacorn and teosinte X *Tripsacum* recombinants referred to as Sun Dance Sun Star contain an

unexpected novel fragment that is 4.9 kb. The 4.9 kb novel allele revealed by UMC140-ERI is also found in subsequent crosses between maize and *Tripsacum*-teosinte recombinants designated 2019, 3024, 3125, TC64, and 9094 X 7009.

As pointed out in the specification, page 20, paragraph 1, "Such mutant or novel rearrangements in the genetic material are revealed by comparative analysis of the RFLP bands of the parent plants and hybrid progeny. Bands present in the offspring not found in either parent indicate regions of the genome where novel genetic material has arisen, i.e. mutations have occurred. . . . mutations are rare, and in most cases deleterious. Broadly speaking among all organisms, mutation rates vary and they range from 1 in 1,000 to 1 in 1,000,000 gametes per generation depending on the gene involved (Curtis and Barnes 1989). For example, each human with approximately 100,000 genes is expected to carry 2 mutant alleles. The unique restriction fragments on the *Tripsacum*-teosinte hybrids occur at 148 out of 176 loci and are unprecedented in their high mutation rate. Furthermore, the novel polymorphisms are stably inherited in succeeding generations of *Tripsacum*-teosinte progeny and of maize by *Tripsacum*-teosinte progeny. In addition to the rarity and usual deleterious effect of mutations, a basic biological tenet is that mutations occur at random or by chance (Lewin 1997). In a study of spontaneous mutation rates to new length alleles at tandemly repeated loci in human DNA (Jeffreys et al. 1988) mutations arose sporadically and there was no clustering of mutations within a family. Siblings never shared a common mutant allele. Therefore, it is unexpected that the same mutations would recur not only among siblings but among hybrids of different parentage." The demonstration of the same unique polymorphisms repeatedly found in hybrid progeny derived from crossing different *Tripsacum* and different teosinte parent plants runs counter to genetic dogma. This phenomenon is unprecedented in the literature, defies the conventional paradigm for parental allelic inheritance in genetics, and clearly establishes that the prior art would neither anticipate, nor render obvious, the claimed invention.

Accordingly, both rejections under 35 U.S.C. §103(a) should be withdrawn.

8. ***Claims Appendix.***

An appendix containing a copy of the claims involved in the appeal.

9. ***Evidence Appendix.***

None.

10. ***Related Proceedings Appendix.***

None.

CONCLUSION

The Appellant maintains that the Examiner has failed to carry his burden of establishing that the claims are not patentable because he has (1) failed to demonstrate that the claims are not novel and has (2) failed to establish that the claims are obvious. Accordingly, claims 23 and 44-70 are allowable. For the reasons presented above in detail, the Appellant respectfully requests that the rejections be overturned.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Appeal Brief-Patents, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 19, 2008

Mary W. Eubanks

Mary W. Eubanks

CLAIMS APPENDIX

APPEALED CLAIMS

1-22. (canceled).

23. (previously presented) A method of identifying a maize progeny plant having a restriction fragment introgressed from a *Tripsacum*/teosinte hybrid, said method comprising the following steps:

(a) isolating the total genomic DNA from the plant;

(b) digesting said genomic DNA with one to five of the restriction enzymes selected from the group consisting of *Eco*RI, *Eco*RV, *Hind*III, *Bam*HI and *Msp*I;

(c) probing said digested genomic DNA with one or more probes, to identify one or more restriction fragments, selected from the group consisting of

BNL5.62, *Eco*RI, 10.3 kb; npi97, *Hind*III, 3.9 kb; UMC157, *Eco*RI, 6.5 kb and 3.3 kb; UMC157, *Hind*III, 5.5 kb; UMC157, *Bam*HI, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *Bam*HI, 7.0 kb; CSU3, *Bam*HI, 10.0 kb and 7.6 kb; UMC67, *Eco*RI, 19.2 kb; UMC67, *Bam*HI 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *Bam*HI, 13.3 kb and 7.5 kb; asg62, *Bam*HI, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *Hind*III, 3.3 kb; CSU164, *Eco*RI, 9.0 kb and 7.0 kb; UMC128, *Hind*III, 6.0 kb; UMC107, *Eco*RI, 7.5.0 kb, 6.3 kb and 6.1 kb; UMC140, *Eco*RI, 4.9 kb; UMC140, *Hind*III, 6.5 kb; adh1, *Hind*III, 9.4 kb; adh1, *Bam*HI, 9.4 kb; UMC161, *Hind*III, 3.3 kb; BNL8.29, *Hind*III, 9.3 kb and 8.3 kb; UMC53, *Eco*RI, 9.4 kb; UMC53, *Eco*RV, *8.4 kb*, 3.8 kb and 3.0 kb; UMC6, *Eco*RI, 3.8 kb; UMC6, *Hind*III 9.4 kb; UMC6, *Bam*HI, 13.2 kb, 12.7 kb, and 7.0 kb; UMC61, *Hind*III, 3.4 and 2.8 kb *agrr167*, *Bam*HI, 5.7 kb, 4.5 kb and 4.0 kb; UMC34, *Eco*RI, 7.5 kb and 5.4 kb; UMC34, *Hind*III, 8.8 kb, 6.5 kb and 5.8 kb; UMC34, *Bam*HI, 9.4 kb; UMC135, *Hind*III, 11.6 kb and 10.8 kb; UMC131, *Eco*RI, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; UMC5, *Eco*RI, 5.4 kb; UMC5, *Hind*III, 6.5 kb; UMC49, *Bam*HI, 8.2 kb; UMC36, *Bam*HI,

4.2 kb; UMC32, *Eco*RI, 5.3 kb; UMC32, *Hind*III 6.7 kb, 6.0 kb, and 2.8 kb; asg24, *Hind*III, 7.2 kb and 6.4 kb; UMC121, *Eco*RI, 3.7 kb and 3.2 kb; BNL8.35, *Hind*III, 9.9 kb and 8.7 kb; *UMC50*, *Bam*HI, *7.8* kb, 6.8 kb, *5.8* kb and 3.8 kb; *UMC42*, *Hind*III, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, *7.6* kb, and 3.7 kb; npi247, *Eco*RI, 8.0 kb; npi247, *Hind*III 3.0 kb; UMC10, *Hind*III, 3.0 kb; UMC10, *Eco*RI, 6.5 kb and 5.5 kb; UMC102, *Eco*RI, 2.7 kb; BNL6.06, *Eco*RI, 6.8 kb; CSU240, *Eco*RI, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *Hind*III, 10.3 kb, 5.8 kb and 3.5 kb; npi296, *Eco*RI, 7.9 kb; UMC3, *Eco*RI 2.5 kb and 2.0 kb; npi212, *Hind*III, 4.3 kb; npi212, *Bam*HI, 5.4 kb; UMC39, *Eco*RI, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb; *phi10080*, *Bam*HI, *9.7* kb; UMC63, *Hind*III, 9.5 kb and 4.3 kb; CSU303, *Eco*RI, 10.0 kb; UMC96, *Hind*III, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *Bam*HI, 7.5 kb; UMC2, *Eco*RI, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; *CSU25*, *Hind*III, *5.2* kb, 4.5 and *4.2* kb; agrr115, *Eco*RI. 8.0 kb and 5.4 kb; agrr115, *Bam*HI, 5.4 kb and 3.5 kb; phi20725, *Eco*RI, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *Hind*III, 1.5 kb; UMC31, *Eco*RI, 5.8 kb and 2.0 kb; *UMC31*, *Bam*HI 6.5 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; CSU235, *Hind*III, 6.8 kb and 3.0 kb; CSU585, *Hind*III, 8.3 kb and 6.1 kb; BNL5.46, *Hind*III, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agrr321, *Bam*HI, 5.5 kb; *agrr89*, *Hind*III, *7.1* kb; npi386, *Hind*III, 12.6 kb, 9.3 kb and 8.2 kb; *UMC42*, *Hind*III, 19.2 kb, 10.3 kb 8.9 kb, *7.6* kb, 3.7 kb and 3.0 kb; *tda62*, *Bam*HI, 5.5 kb, 5.2 kb, 4.8 kb and *4.2* kb; BNL5.71, *Eco*RV, 11.3 kb, 6.8 kb, and 5.7 kb; UMC156, *Hind*III, 3.0 kb; UMC66, *Eco*RI, 10.5 kb; UMC66, *Bam*HI, 3.7 kb and 2.4 kb; UMC19, *Bam*HI, 12.3 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; UMC133, *Hind*III, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *Bam*HI, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *Hind*III, 2.9 kb and 2.7 kb; npi409, *Eco*RI, 9.4 kb; npi409, *Hind*III, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *Hind*III, 16.3 kb, 3.8 kb and 2.4 kb; *asg73*, *Eco*RI, *3.8* kb; UMC90, *Hind*III, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *Bam*HI, 9.0 kb; *UMC72*,

*Eco*RI, *8.5* kb; UMC27, *Hind*III, 8.3 kb and 4.5 kb; UMC27, *Bam*HI, 6.5 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *Bam*HI, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *Bam*HI, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *Hind*III, 10.6 kb; BNL5.71, *Bam*HI, 11.3 kb, 6.8 kb and 5.7 kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; npi373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; *npi393*, *Eco*RI, 12.1 kb, 8.5 kb, *7.0* kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, HindIII, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; *asg8*, *Hind*III, 10.8 kb, *8.7* kb and 8.4 kb; *phi20581*, *Hind*III, *4.2* kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; *UMC110*, *Bam*HI, 10.6 kb, 4.9 kb and *3.9* kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; *UMC80*, *Hind*III, *10.7* kb, *8.2* kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; npi114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, BamHI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; *UMC48*, *Hind*III, *6.2* kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; *UMC53*, *Eco*RV, 8.4 kb; npi268, *Bam*HI, 6.4 kb; *UMC7*, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi10005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113, *Eco*RI, 5.9 kb and 5.4 kb; UMC113, *Bam*HI, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *Hind*III, 11.4 kb and 6.4 kb; wx (waxy), *Hind*III, 21.0 kb; UMC105, *Eco*RI, 3.9 kb; CSU147, *Hind*III 5.9 kb; BNL5.10, *Hind*III, 6.1 kb

and 4.4 kb; UMC114, *Bam*HI, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *Eco*RI, 5.6 kb; UMC95, *Hind*III, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb 4.1 kb and 1.7 kb; UMC95, *Bam*HI, 15.0 kb and 9.0 kb; asg44, *Eco*RI, 5.3 kb; CSU61, *Eco*RI, 8.1 kb and 4.8 kb; BNL7.57, *Bam*HI, 11.6 kb and 5.9 kb; CSU54, *Eco*RI, 14.7 kb and 12.6 kb; phi20075, *Eco*RI, 7.1 kb; npi285, *Eco*RI, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *Eco*RI, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *Eco*RI, 13.5 kb and 7.0 kb; UMC130, *Hind*III, 4.8 kb and 3.2 kb; UMC130, *Bam*HI, 3.2 kb; UMC64, *Hind*III, 3.3 kb; UMC152, *Hind*III, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *Eco*RI, 12.8 kb; *UMC163*, *Hind*III, 7.0 kb, 4.8 kb; 3.0 kb; *2.6* kb and 2.3 kb; UMC44, *Hind*III, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *Hind*III, 10.8 kb; npi306, *Hind*III, 7.0 kb; pmt1, *Hind*III, 2.3 kb; pmt2, *Hind*III, 2.8 kb and 2.1 kb; *pmt5*, *Hind*III, 12.3 kb, 8.1 kb, *3.6* kb, 3.2 kb and 2.5 kb; tda48, *Hind*III, 8.2 kb; tda53, *Hind*III, 3.8 kb and 2.2 kb; tda168, *Eco*RI, 3.6 kb; tda16, *Hind*III, 4.3 kb; and tda17, *Hind*III, 7.0 kb; tda250, *Bam*HI, 4.0 kb, recited as marker-enzyme fragment size;

(d) determining the presence of one or more of the restriction fragments.

24-43. (canceled)

44. (previously presented) A maize plant comprising one or more restriction fragments selected from the group consisting of

BNL5.62, *Eco*RI, 10.3 kb; npi97, *Hind*III, 3.9 kb; UMC157, *Eco*RI, 6.5 kb and 3.3 kb; UMC157, *Hind*III, 5.5 kb; UMC157, *Bam*HI, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *Bam*HI, 7.0 kb; CSU3, *Bam*HI, 10.0 kb and 7.6 kb; UMC67, *Eco*RI, 19.2 kb; UMC67, *Bam*HI 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *Bam*HI, 13.3 kb and 7.5 kb; asg62, *Bam*HI, 12.7 kb, 9.7 kb and 6.6 kb; UMC58,

*Hind*III, 3.3 kb; CSU164, *Eco*RI, 9.0 kb and 7.0 kb; UMC128, *Hind*III, 6.0 kb; UMC107, *Eco*RI, 7.5.0 kb, 6.3 kb and 6.1 kb; UMC140, *Eco*RI, 4.9 kb; UMC140, *Hind*III, 6.5 kb; adh1, *Hind*III, 9.4 kb; adh1, *Bam*HI, 9.4 kb; UMC161, *Hind*III, 3.3 kb; BNL8.29, *Hind*III, 9.3 kb and 8.3 kb; UMC53, *Eco*RI, 9.4 kb; UMC53, *Eco*RV, *8.4 kb*, 3.8 kb and 3.0 kb; UMC6, *Eco*RI, 3.8 kb; UMC6, *Hind*III 9.4 kb; UMC6, *Bam*HI, 13.2 kb, 12.7 kb, and 7.0 kb; UMC61, *Hind*III, 3.4 and 2.8 kb *agrr167*, *Bam*HI, 5.7 kb, 4.5 kb and 4.0 kb; UMC34, *Eco*RI, 7.5 kb and 5.4 kb; UMC34, *Hind*III, 8.8 kb, 6.5 kb and 5.8 kb; UMC34, *Bam*HI, 9.4 kb; UMC135, *Hind*III, 11.6 kb and 10.8 kb; UMC131, *Eco*RI, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; UMC5, *Eco*RI, 5.4 kb; UMC5, *Hind*III, 6.5 kb; UMC49, *Bam*HI, 8.2 kb; UMC36, *Bam*HI, 4.2 kb; UMC32, *Eco*RI, 5.3 kb; UMC32, *Hind*III 6.7 kb, 6.0 kb, and 2.8 kb; asg24, *Hind*III, 7.2 kb and 6.4 kb; UMC121, *Eco*RI, 3.7 kb and 3.2 kb; BNL8.35, *Hind*III, 9.9 kb and 8.7 kb; *UMC50*, *Bam*HI, *7.8* kb, 6.8 kb, *5.8* kb and 3.8 kb; *UMC42*, *Hind*III, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, *7.6* kb, and 3.7 kb; npi247, *Eco*RI, 8.0 kb; npi247, *Hind*III 3.0 kb; UMC10, *Hind*III, 3.0 kb; UMC10, *Eco*RI, 6.5 kb and 5.5 kb; UMC102, *Eco*RI, 2.7 kb; BNL6.06, *Eco*RI, 6.8 kb; CSU240, *Eco*RI, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *Hind*III, 10.3 kb, 5.8 kb and 3.5 kb; npi296, *Eco*RI, 7.9 kb; UMC3, *Eco*RI 2.5 kb and 2.0 kb; npi212, *Hind*III, 4.3 kb; npi212, *Bam*HI, 5.4 kb; UMC39, *Eco*RI, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb; *phi10080*, *Bam*HI, *9.7* kb; UMC63, *Hind*III, 9.5 kb and 4.3 kb; CSU303, *Eco*RI, 10.0 kb; UMC96, *Hind*III, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *Bam*HI, 7.5 kb; UMC2, *Eco*RI, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; *CSU25*, *Hind*III, *5.2* kb, 4.5 and *4.2* kb; agrr115, *Eco*RI. 8.0 kb and 5.4 kb; agrr115, *Bam*HI, 5.4 kb and 3.5 kb; phi20725, *Eco*RI, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *Hind*III, 1.5 kb; UMC31, *Eco*RI, 5.8 kb and 2.0 kb; *UMC31*, *Bam*HI 6.5 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; CSU235, *Hind*III, 6.8 kb and 3.0 kb; CSU585, *Hind*III, 8.3 kb and 6.1 kb; BNL5.46, *Hind*III,

13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agrr321, *Bam*HI, 5.5 kb; *agrr89*, *Hind*III, *7.1* kb; npi386, *Hind*III, 12.6 kb, 9.3 kb and 8.2 kb; *UMC42*, *Hind*III, 19.2 kb, 10.3 kb 8.9 kb, *7.6* kb, 3.7 kb and 3.0 kb; *tda62*, *Bam*HI, 5.5 kb, 5.2 kb, 4.8 kb and *4.2* kb; BNL5.71, *Eco*RV, 11.3 kb, 6.8 kb, and 5.7 kb; UMC156, *Hind*III, 3.0 kb; UMC66, *Eco*RI, 10.5 kb; UMC66, *Bam*HI, 3.7 kb and 2.4 kb; UMC19, *Bam*HI, 12.3 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; UMC133, *Hind*III, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *Bam*HI, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *Hind*III, 2.9 kb and 2.7 kb; npi409, *Eco*RI, 9.4 kb; npi409, *Hind*III, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *Hind*III, 16.3 kb, 3.8 kb and 2.4 kb; *asg73*, *Eco*RI, *3.8* kb; UMC90, *Hind*III, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *Bam*HI, 9.0 kb; *UMC72*, *Eco*RI, *8.5* kb; UMC27, *Hind*III, 8.3 kb and 4.5 kb; UMC27, *Bam*HI, 6.5 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *Bam*HI, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *Bam*HI, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *Hind*III, 10.6 kb; BNL5.71, *Bam*HI, 11.3 kb, 6.8 kb and 5.7 kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; npi373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; *npi393*, *Eco*RI, 12.1 kb, 8.5 kb, *7.0* kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, HindIII, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; *asg8*, *Hind*III, 10.8 kb, *8.7* kb and 8.4 kb; *phi20581*, *Hind*III, *4.2* kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; *UMC110*, *Bam*HI, 10.6 kb, 4.9 kb and *3.9* kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; *UMC80*, *Hind*III, *10.7* kb, *8.2* kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; npi114, *Hind*III,

10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, BamHI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; *UMC48*, *Hind*III, *6.2* kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; *UMC53*, *Eco*RV, 8.4 kb; npi268, *Bam*HI, 6.4 kb; *UMC7*, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi10005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113, *Eco*RI, 5.9 kb and 5.4 kb; UMC113, *Bam*HI, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *Hind*III, 11.4 kb and 6.4 kb; wx (waxy), *Hind*III, 21.0 kb; UMC105, *Eco*RI, 3.9 kb; CSU147, *Hind*III 5.9 kb; BNL5.10, *Hind*III, 6.1 kb and 4.4 kb; UMC114, *Bam*HI, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *Eco*RI, 5.6 kb; UMC95, *Hind*III, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb 4.1 kb and 1.7 kb; UMC95, *Bam*H!, 15.0 kb and 9.0 kb; asg44, *Eco*RI, 5.3 kb; CSU61, *Eco*RI, 8.1 kb and 4.8 kb; BNL7.57, *Bam*HI, 11.6 kb and 5.9 kb; CSU54, *Eco*RI, 14.7 kb and 12.6 kb; phi20075, *Eco*RI, 7.1 kb; npi285, *Eco*RI, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *Eco*RI, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *Eco*RI, 13.5 kb and 7.0 kb; UMC130, *Hind*III, 4.8 kb and 3.2 kb; UMC130, *Bam*HI, 3.2 kb; UMC64, *Hind*III, 3.3 kb; UMC152, *Hind*III, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *Eco*RI, 12.8 kb; *UMC163*, *Hind*III, 7.0 kb, 4.8 kb; 3.0 kb; *2.6* kb and 2.3 kb; UMC44, *Hind*III, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *Hind*III, 10.8 kb; npi306, *Hind*III, 7.0 kb; pmt1, *Hind*III, 2.3 kb; pmt2, *Hind*III, 2.8 kb and 2.1 kb; *pmt5*, *Hind*III, 12.3 kb, 8.1 kb, *3.6* kb, 3.2 kb and 2.5 kb; tda48, *Hind*III, 8.2 kb; tda53, *Hind*III, 3.8 kb and 2.2 kb; tda168, *Eco*RI, 3.6 kb; tda16, *Hind*III, 4.3 kb; and tda17, *Hind*III, 7.0 kb; tda250, *Bam*HI, 4.0 kb, recited as marker-enzyme fragment size;

wherein said maize plant is produced by:

(a) cross pollinating a maize female plant with either a (*Tripsacum* X teosinte) male plant or a (teosinte X *Tripsacum*) male plant to produce a trigeneric hybrid maize plant;

(b) backcrossing said trigeneric hybrid plant produced in step (a) at least once to a maize plant.

45. (previously presented) A seed, pollen, all derivatives, subsequent generations, variants, mutants, modifications, and cellular components produced by the plant of claim 44.

46. (previously presented) A maize plant according to claim 44 whereby the roots of said plant contain aerenchyma.

47. (previously presented) A maize plant according to claim 44 whereby said plant is drought tolerant.

48. (previously presented) A maize plant according claim 44 whereby said plant is tolerant to corn rootworm.

49. (previously presented) A maize plant according to claim 44 further comprising a novel band identified by SSR probe phi123.

50. (previously presented) A maize plant according to claim 44 further comprising a novel band identified by SSR probe bnlg2235.

51. (previously presented) A maize plant according to claim 44 further comprising a novel band identified by SSR probe dupSSR23.

52. (previously presented) A maize plant according to claim 44 further comprising a novel band identified by SSR probe bnlg1805.

53. (previously presented) A maize plant comprising one or more restriction fragments selected from the group consisting of

BNL5.62, *Eco*RI, 10.3 kb; npi97, *Hind*III, 3.9 kb; UMC157, *Eco*RI, 6.5 kb and 3.3 kb; UMC157, *Hind*III, 5.5 kb; UMC157, *Bam*HI, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *Bam*HI, 7.0 kb; CSU3, *Bam*HI, 10.0 kb and 7.6 kb; UMC67, *Eco*RI, 19.2 kb; UMC67, *Bam*HI 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *Bam*HI, 13.3 kb and 7.5 kb; asg62, *Bam*HI, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *Hind*III, 3.3 kb; CSU164, *Eco*RI, 9.0 kb and 7.0 kb; UMC128, *Hind*III, 6.0 kb; UMC107, *Eco*RI, 7.5.0 kb, 6.3 kb and 6.1 kb; UMC140, *Eco*RI, 4.9 kb; UMC140, *Hind*III, 6.5 kb; adh1, *Hind*III, 9.4 kb; adh1, *Bam*HI, 9.4 kb; UMC161, *Hind*III, 3.3 kb; BNL8.29, *Hind*III, 9.3 kb and 8.3 kb; UMC53, *Eco*RI, 9.4 kb; UMC53, *Eco*RV, *8.4 kb*, 3.8 kb and 3.0 kb; UMC6, *Eco*RI, 3.8 kb; UMC6, *Hind*III 9.4 kb; UMC6, *Bam*HI, 13.2 kb, 12.7 kb, and 7.0 kb; UMC61, *Hind*III, 3.4 and 2.8 kb *agrr167*, *Bam*HI, 5.7 kb, 4.5 kb and 4.0 kb; UMC34, *Eco*RI, 7.5 kb and 5.4 kb; UMC34, *Hind*III, 8.8 kb, 6.5 kb and 5.8 kb; UMC34, *Bam*HI, 9.4 kb; UMC135, *Hind*III, 11.6 kb and 10.8 kb; UMC131, *Eco*RI, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; UMC5, *Eco*RI, 5.4 kb; UMC5, *Hind*III, 6.5 kb; UMC49, *Bam*HI, 8.2 kb; UMC36, *Bam*HI, 4.2 kb; UMC32, *Eco*RI, 5.3 kb; UMC32, *Hind*III 6.7 kb, 6.0 kb, and 2.8 kb; asg24, *Hind*III, 7.2 kb and 6.4 kb; UMC121, *Eco*RI, 3.7 kb and 3.2 kb; BNL8.35, *Hind*III, 9.9 kb and 8.7 kb; *UMC50*, *Bam*HI, *7.8* kb, 6.8 kb, *5.8* kb and 3.8 kb; *UMC42*, *Hind*III, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, *7.6* kb, and 3.7 kb; npi247, *Eco*RI, 8.0 kb; npi247, *Hind*III 3.0 kb; UMC10, *Hind*III, 3.0 kb; UMC10, *Eco*RI, 6.5 kb and 5.5 kb; UMC102, *Eco*RI, 2.7 kb; BNL6.06, *Eco*RI, 6.8 kb; CSU240, *Eco*RI, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *Hind*III, 10.3 kb, 5.8 kb and 3.5 kb; npi296, *Eco*RI, 7.9 kb; UMC3, *Eco*RI 2.5 kb and 2.0 kb; npi212, *Hind*III, 4.3 kb; npi212, *Bam*HI, 5.4 kb; UMC39, *Eco*RI, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb; *phi10080*, *Bam*HI, *9.7* kb; UMC63, *Hind*III, 9.5 kb and 4.3 kb; CSU303, *Eco*RI, 10.0 kb; UMC96, *Hind*III, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *Bam*HI, 7.5 kb; UMC2, *Eco*RI, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; *CSU25*,

*Hind*III, *5.2* kb, 4.5 and *4.2* kb; agrr115, *Eco*RI. 8.0 kb and 5.4 kb; agrr115, *Bam*HI, 5.4 kb and 3.5 kb; phi20725, *Eco*RI, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *Hind*III, 1.5 kb; UMC31, *Eco*RI, 5.8 kb and 2.0 kb; *UMC31*, *Bam*HI 6.5 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; CSU235, *Hind*III, 6.8 kb and 3.0 kb; CSU585, *Hind*III, 8.3 kb and 6.1 kb; BNL5.46, *Hind*III, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agrr321, *Bam*HI, 5.5 kb; *agrr89*, *Hind*III, *7.1* kb; npi386, *Hind*III, 12.6 kb, 9.3 kb and 8.2 kb; *UMC42*, *Hind*III, 19.2 kb, 10.3 kb 8.9 kb, *7.6* kb, 3.7 kb and 3.0 kb; *tda62*, *Bam*HI, 5.5 kb, 5.2 kb, 4.8 kb and *4.2* kb; BNL5.71, *Eco*RV, 11.3 kb, 6.8 kb, and 5.7 kb; UMC156, *Hind*III, 3.0 kb; UMC66, *Eco*RI, 10.5 kb; UMC66, *Bam*HI, 3.7 kb and 2.4 kb; UMC19, *Bam*HI, 12.3 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; UMC133, *Hind*III, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *Bam*HI, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *Hind*III, 2.9 kb and 2.7 kb; npi409, *Eco*RI, 9.4 kb; npi409, *Hind*III, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *Hind*III, 16.3 kb, 3.8 kb and 2.4 kb; *asg73*, *Eco*RI, *3.8* kb; UMC90, *Hind*III, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *Bam*HI, 9.0 kb; *UMC72*, *Eco*RI, *8.5* kb; UMC27, *Hind*III, 8.3 kb and 4.5 kb; UMC27, *Bam*HI, 6.5 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *Bam*HI, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *Bam*HI, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *Hind*III, 10.6 kb; BNL5.71, *Bam*HI, 11.3 kb, 6.8 kb and 5.7 kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; npi373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; *npi393*, *Eco*RI, 12.1 kb, 8.5 kb, *7.0* kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, HindIII, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; *asg8*, *Hind*III, 10.8 kb, *8.7* kb and 8.4 kb; *phi20581*, *Hind*III, *4.2* kb; O2, *Eco*RI, 9.4 kb; asg34,

*Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; *UMC110*, *Bam*HI, 10.6 kb, 4.9 kb and *3.9* kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; *UMC80*, *Hind*III, *10.7* kb, *8.2* kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; npi114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, BamHI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; *UMC48*, *Hind*III, *6.2* kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; *UMC53*, *Eco*RV, 8.4 kb; npi268, *Bam*HI, 6.4 kb; *UMC7*, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi10005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113, *Eco*RI, 5.9 kb and 5.4 kb; UMC113, *Bam*HI, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *Hind*III, 11.4 kb and 6.4 kb; wx (waxy), *Hind*III, 21.0 kb; UMC105, *Eco*RI, 3.9 kb; CSU147, *Hind*III 5.9 kb; BNL5.10, *Hind*III, 6.1 kb and 4.4 kb; UMC114, *Bam*HI, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *Eco*RI, 5.6 kb; UMC95, *Hind*III, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb 4.1 kb and 1.7 kb; UMC95, *Bam*HI, 15.0 kb and 9.0 kb; asg44, *Eco*RI, 5.3 kb; CSU61, *Eco*RI, 8.1 kb and 4.8 kb; BNL7.57, *Bam*HI, 11.6 kb and 5.9 kb; CSU54, *Eco*RI, 14.7 kb and 12.6 kb; phi20075, *Eco*RI, 7.1 kb; npi285, *Eco*RI, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *Eco*RI, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *Eco*RI, 13.5 kb and 7.0 kb; UMC130, *Hind*III, 4.8 kb and 3.2 kb; UMC130, *Bam*HI, 3.2 kb; UMC64, *Hind*III, 3.3 kb; UMC152, *Hind*III, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *Eco*RI, 12.8 kb; *UMC163*, *Hind*III, 7.0 kb, 4.8 kb; 3.0 kb; *2.6* kb and 2.3 kb; UMC44, *Hind*III, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *Hind*III, 10.8 kb; npi306, *Hind*III, 7.0 kb; pmt1, *Hind*III, 2.3 kb; pmt2, *Hind*III, 2.8 kb and 2.1 kb; *pmt5*, *Hind*III, 12.3 kb, 8.1 kb,

3.6 kb, 3.2 kb and 2.5 kb; tda48, *Hind*III, 8.2 kb; tda53, *Hind*III, 3.8 kb and 2.2 kb; tda168, *Eco*RI, 3.6 kb; tda16, *Hind*III, 4.3 kb; and tda17, *Hind*III, 7.0 kb; tda250, *Bam*HI, 4.0 kb, recited as marker-enzyme fragment size;

wherein said maize plant is produced by:

(a) cross pollinating either a (*Tripsacum* X teosinte) female plant or a (teosinte X *Tripsacum*) female plant with a maize male plant to produce a trigeneric hybrid plant;

(b) backcrossing said trigeneric hybrid plant produced in step (a) at least once to a maize plant;.

54. (previously presented) A seed, pollen, all derivatives, subsequent generations, variants, mutants, modifications, and cellular components produced by the plant of claim 53.

55. (previously presented) A maize plant according to claim 53 whereby the roots of said plant contain aerenchyma.

56. (previously presented) A maize plant according to claim 53 whereby said plant is drought tolerant.

57. (previously presented) A maize plant according to claim 53 whereby said plant is tolerant to corn rootworm.

58. (previously presented) A maize plant according to claim 53 further comprising a novel band identified by SSR probe phi123.

59 (previously presented) A maize plant according to claim 53 further comprising a novel band identified by SSR probe bnlg2235.

60. (previously presented) A maize plant according to claim 53 further comprising a novel band identified by SSR probe dupSSR23.

61 (previously presented) A maize plant according to claim 53 further comprising a novel band identified by SSR probe bnlg1805.

62. (previously presented) A maize plant comprising one or more restriction fragments selected from the group consisting of

BNL5.62, *Eco*RI, 10.3 kb; npi97, *Hind*III, 3.9 kb; UMC157, *Eco*RI, 6.5 kb and 3.3 kb; UMC157, *Hind*III, 5.5 kb; UMC157, *Bam*HI, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *Bam*HI, 7.0 kb; CSU3, *Bam*HI, 10.0 kb and 7.6 kb; UMC67, *Eco*RI, 19.2 kb; UMC67, *Bam*HI 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *Bam*HI, 13.3 kb and 7.5 kb; asg62, *Bam*HI, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *Hind*III, 3.3 kb; CSU164, *Eco*RI, 9.0 kb and 7.0 kb; UMC128, *Hind*III, 6.0 kb; UMC107, *Eco*RI, 7.5.0 kb, 6.3 kb and 6.1 kb; UMC140, *Eco*RI, 4.9 kb; UMC140, *Hind*III, 6.5 kb; adh1, *Hind*III, 9.4 kb; adh1, *Bam*HI, 9.4 kb; UMC161, *Hind*III, 3.3 kb; BNL8.29, *Hind*III, 9.3 kb and 8.3 kb; UMC53, *Eco*RI, 9.4 kb; UMC53, *Eco*RV, *8.4 kb*, 3.8 kb and 3.0 kb; UMC6, *Eco*RI, 3.8 kb; UMC6, *Hind*III 9.4 kb; UMC6, *Bam*HI, 13.2 kb, 12.7 kb, and 7.0 kb; UMC61, *Hind*III, 3.4 and 2.8 kb *agrr167*, *Bam*HI, 5.7 kb, 4.5 kb and 4.0 kb; UMC34, *Eco*RI, 7.5 kb and 5.4 kb; UMC34, *Hind*III, 8.8 kb, 6.5 kb and 5.8 kb; UMC34, *Bam*HI, 9.4 kb; UMC135, *Hind*III, 11.6 kb and 10.8 kb; UMC131, *Eco*RI, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; UMC5, *Eco*RI, 5.4 kb; UMC5, *Hind*III, 6.5 kb; UMC49, *Bam*HI, 8.2 kb; UMC36, *Bam*HI, 4.2 kb; UMC32, *Eco*RI, 5.3 kb; UMC32, *Hind*III 6.7 kb, 6.0 kb, and 2.8 kb; asg24, *Hind*III, 7.2 kb and 6.4 kb; UMC121, *Eco*RI, 3.7 kb and 3.2 kb; BNL8.35, *Hind*III, 9.9 kb and 8.7 kb; *UMC50*, *Bam*HI, *7.8* kb, 6.8 kb, *5.8* kb and 3.8 kb; *UMC42*, *Hind*III, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, *7.6* kb, and 3.7 kb; npi247, *Eco*RI, 8.0 kb; npi247, *Hind*III 3.0 kb; UMC10, *Hind*III, 3.0 kb; UMC10, *Eco*RI, 6.5 kb and 5.5 kb; UMC102, *Eco*RI, 2.7 kb; BNL6.06, *Eco*RI, 6.8 kb; CSU240, *Eco*RI, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *Hind*III, 10.3 kb, 5.8 kb and 3.5 kb; npi296,

*Eco*RI, 7.9 kb; UMC3, *Eco*RI 2.5 kb and 2.0 kb; npi212, *Hind*III, 4.3 kb; npi212, *Bam*HI, 5.4 kb; UMC39, *Eco*RI, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb; *phi10080*, *Bam*HI, *9.7* kb; UMC63, *Hind*III, 9.5 kb and 4.3 kb; CSU303, *Eco*RI, 10.0 kb; UMC96, *Hind*III, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *Bam*HI, 7.5 kb; UMC2, *Eco*RI, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; *CSU25*, *Hind*III, *5.2* kb, 4.5 and *4.2* kb; agrr115, *Eco*RI. 8.0 kb and 5.4 kb; agrr115, *Bam*HI, 5.4 kb and 3.5 kb; phi20725, *Eco*RI, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *Hind*III, 1.5 kb; UMC31, *Eco*RI, 5.8 kb and 2.0 kb; *UMC31*, *Bam*HI 6.5 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; CSU235, *Hind*III, 6.8 kb and 3.0 kb; CSU585, *Hind*III, 8.3 kb and 6.1 kb; BNL5.46, *Hind*III, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agrr321, *Bam*HI, 5.5 kb; *agrr89*, *Hind*III, *7.1* kb; npi386, *Hind*III, 12.6 kb, 9.3 kb and 8.2 kb; *UMC42*, *Hind*III, 19.2 kb, 10.3 kb 8.9 kb, *7.6* kb, 3.7 kb and 3.0 kb; *tda62*, *Bam*HI, 5.5 kb, 5.2 kb, 4.8 kb and *4.2* kb; BNL5.71, *Eco*RV, 11.3 kb, 6.8 kb, and 5.7 kb; UMC156, *Hind*III, 3.0 kb; UMC66, *Eco*RI, 10.5 kb; UMC66, *Bam*HI, 3.7 kb and 2.4 kb; UMC19, *Bam*HI, 12.3 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; UMC133, *Hind*III, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *Bam*HI, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *Hind*III, 2.9 kb and 2.7 kb; npi409, *Eco*RI, 9.4 kb; npi409, *Hind*III, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *Hind*III, 16.3 kb, 3.8 kb and 2.4 kb; *asg73*, *Eco*RI, *3.8* kb; UMC90, *Hind*III, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *Bam*HI, 9.0 kb; *UMC72*, *Eco*RI, *8.5* kb; UMC27, *Hind*III, 8.3 kb and 4.5 kb; UMC27, *Bam*HI, 6.5 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *Bam*HI, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *Bam*HI, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *Hind*III, 10.6 kb; BNL5.71, *Bam*HI, 11.3 kb, 6.8 kb and 5.7 kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; npi373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb;

tda204, *Bam*HI, 4.0 kb; *npi393*, *Eco*RI, 12.1 kb, 8.5 kb, *7.0* kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, HindIII, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; *asg8*, *Hind*III, 10.8 kb, *8.7* kb and 8.4 kb; *phi20581*, *Hind*III, *4.2* kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; *UMC110*, *Bam*HI, 10.6 kb, 4.9 kb and *3.9* kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; *UMC80*, *Hind*III, *10.7* kb, *8.2* kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; npi114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, BamHI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; *UMC48*, *Hind*III, *6.2* kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; *UMC53*, *Eco*RV, 8.4 kb; npi268, *Bam*HI, 6.4 kb; *UMC7*, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi10005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113, *Eco*RI, 5.9 kb and 5.4 kb; UMC113, *Bam*HI, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *Hind*III, 11.4 kb and 6.4 kb; wx (waxy), *Hind*III, 21.0 kb; UMC105, *Eco*RI, 3.9 kb; CSU147, *Hind*III 5.9 kb; BNL5.10, *Hind*III, 6.1 kb and 4.4 kb; UMC114, *Bam*HI, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *Eco*RI, 5.6 kb; UMC95, *Hind*III, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb 4.1 kb and 1.7 kb; UMC95, *Bam*Hi, 15.0 kb and 9.0 kb; asg44, *Eco*RI, 5.3 kb; CSU61, *Eco*RI, 8.1 kb and 4.8 kb; BNL7.57, *Bam*HI, 11.6 kb and 5.9 kb; CSU54, *Eco*RI, 14.7 kb and 12.6 kb; phi20075, *Eco*RI, 7.1 kb; npi285, *Eco*RI, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *Eco*RI, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *Eco*RI, 13.5 kb and 7.0 kb; UMC130, *Hind*III, 4.8 kb and 3.2 kb; UMC130,

*Bam*HI, 3.2 kb; UMC64, *Hind*III, 3.3 kb; UMC152, *Hind*III, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *Eco*RI, 12.8 kb; *UMC163*, *Hind*III, 7.0 kb, 4.8 kb; 3.0 kb; *2.6* kb and 2.3 kb; UMC44, *Hind*III, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *Hind*III, 10.8 kb; npi306, *Hind*III, 7.0 kb; pmt1, *Hind*III, 2.3 kb; pmt2, *Hind*III, 2.8 kb and 2.1 kb; *pmt5*, *Hind*III, 12.3 kb, 8.1 kb, *3.6* kb, 3.2 kb and 2.5 kb; tda48, *Hind*III, 8.2 kb; tda53, *Hind*III, 3.8 kb and 2.2 kb; tda168, *Eco*RI, 3.6 kb; tda16, *Hind*III, 4.3 kb; and tda17, *Hind*III, 7.0 kb; tda250, *Bam*HI, 4.0 kb, recited as marker-enzyme fragment size;

wherein said plant is produced by:

(a) cross pollinating a maize female plant with either a (*Tripsacum* X teosinte) male plant or a (teosinte X *Tripsacum*) male plant to produce a hybrid maize plant;

(b) backcrossing said hybrid maize plant produced in step (a) at least once to a (*Tripsacum* X teosinte) plant or a (teosinte X *Tripsacum*) plant~~;~~.

63. (previously presented) A seed, pollen, all derivatives, subsequent generations, variants, mutants, modifications, and cellular components produced by the plant of claim 62.

64. (previously presented) A maize plant according to claim 62 whereby the roots of said plant contain aerenchyma.

65. (previously presented) A maize plant according to claim 62 whereby said plant is drought tolerant.

66. (previously presented) A maize plant according to claim 62 whereby said plant is tolerant to corn rootworm.

67. (previously presented) A maize plant according to claim 62 further comprising a novel band identified by SSR probe phi123.

68. (previously presented) A maize plant according to claim 62 further comprising a novel band identified by SSR probe bnlg2235.

69. (previously presented) A maize plant according to claim 62 further comprising a novel band identified by SSR probe dupSSR23.

70. (previously presented) A maize plant according to claim 62 further comprising a novel band identified by SSR probe bnlg1805.

71-79. (canceled)